

# **iCS 80<sup>T.M.</sup> INDUSTRIAL CHASSIS HARDWARE REFERENCE MANUAL**

Manual Order Number: 9800799-02

## **CHANGES:**

Change 1 has been incorporated into this manual.  
Refer to Change Notice 9803135-01 at the back of this  
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## PREFACE

This manual provides information necessary to plan, assemble, install and operate an iCS 80 System. Additional information is available in the following documents:

- *Intel iCS 80 Industrial System Site Planning and Installation Guide*, Order No. 9800798A.
- *Intel iSBC 635 Power Supply Hardware Reference Manual*, Order No. 9800298.
- *Intel iSBC 640 Power Supply Hardware Reference Manual*, Order No. 9800803.
- *Intel iCS 910 Analog Signal Conditioning/Termination Panel Hardware Reference Manual*, Order No. 9800800.
- *Intel iCS 920 Digital Signal Conditioning/Termination Panel Hardware Reference Manual*, Order No. 9800801.
- *Intel iCS 930 AC Signal Conditioning/Termination Panel Hardware Reference Manual*, Order No. 9800802.
- *Intel iSBC 86/12 Single Board Computer Hardware Reference Manual*, Order No. 9800645.
- *Intel iSBC 80/30 Single Board Computer Hardware Reference Manual*, Order No. 9800311.
- *Intel iSBC 80/20 Single Board Computer Hardware Reference Manual*, Order No. 9800484.
- *Intel iSBC 80/10 Single Board Computer Hardware Reference Manual*, Order No. 9800230.
- *Intel iSBC 604/614 Cardcage Hardware Reference Manual*, Order No. 9800708.
- *Intel iSBC 80/05 Single Board Computer Hardware Reference Manual*, Order No. 9800483.



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### 1-1. INTRODUCTION

The iCS 80 Chassis (figure 1-1) is designed for use in an industrial environment. The chassis consists of a four slot cardcage, four fans, a control panel and a 19" RETMA-compatible chassis. This chapter provides a description of the chassis, a list of equipment and documentation supplied, a list of documentation required but not supplied, and a table of chassis specifications.

### 1-2. DESCRIPTION

The iCS 80 Chassis is designed to be rack mounted, using 19" RETMA (Radio-Electronics-Television Manufacturers Association) compatible components, or mounted into a NEMA (National Electrical Manufacturers Association) compatible enclosure. The chassis houses the cardcage, control panel, and fans, and provides power distribution for each.

The control panel contains the power OFF/ON/LOCK key-switch, the interrupt pushbutton, and the HALT, POWER ON, and RUN LED indicators. The printed circuit board cover panel snaps off to expose

the switches and indicators, and the printed circuit board that holds the related circuitry.

The iCS 80 Chassis contains the iSBC 604 Cardcage Assembly and a maximum of two additional customer supplied iSBC 614 Cardcage Expansion Assemblies. The cardcages comprise a backplane assembly that conforms to the *Intel MULTIBUS Application Note, AP-28*.

Four cooling fans are mounted inside the chassis; three below the cardcage mounting area and one above the power supply mounting area.

### 1-3. COMPATIBILITY

The iCS 80 Chassis is designed to be part of a modular microcomputer based industrial control system. The chassis will house the Intel iSBC 635 Power Supply or iSBC 640 Power Supply. Any of the Intel iSBC series plug-in modules may be installed into the cardcages inside the iCS 80 Chassis; i.e., most single board computers, memory expansion boards, and interface boards.

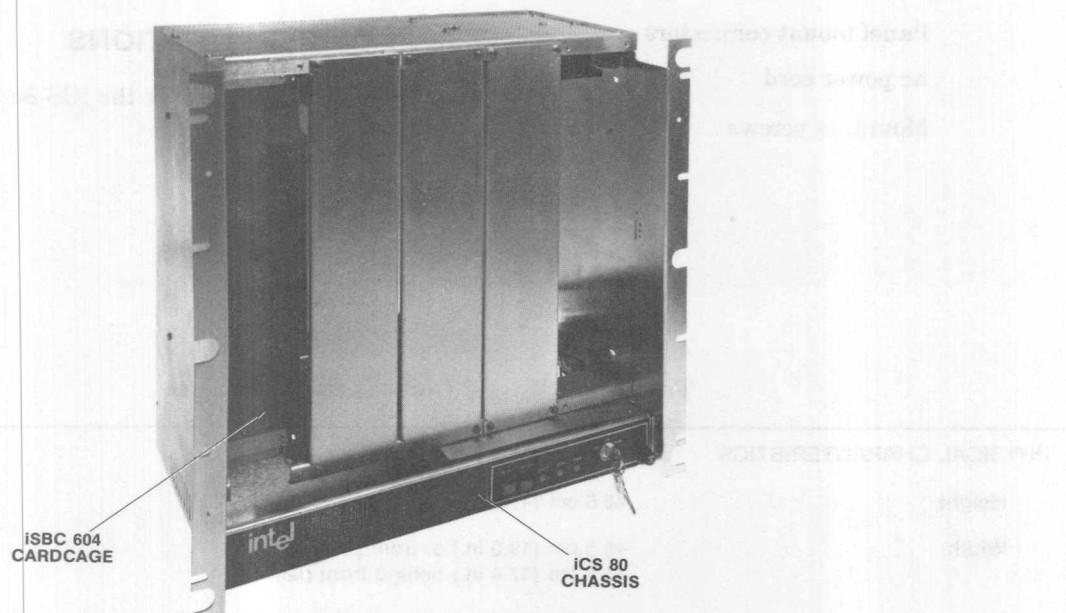


Figure 1-1. iCS 80 Chassis

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## 1-4. DOCUMENTATION SUPPLIED

The documentation supplied with the iCS 80 Chassis includes the *iCS 80 Industrial Chassis Hardware Reference Manual* (9800799), the *iSBC 604/614 Cardcage Hardware Reference Manual* (9800708), and the *iCS 80 Industrial System Site Planning and Installation Guide* (9800798A).

A chassis wiring diagram, a control panel printed circuit board logic diagram, and a replacement parts listing are located in the Service Information section of this manual. Similar information for the cardcage is contained in the iSBC 604/614 Cardcage documentation.

## 1-5. EQUIPMENT SUPPLIED

The following equipment is supplied with the iCS 80 Chassis: control panel with switches and indicators, four fans, power distribution strip, power cord, ac line fuse, line filter, and support/protection panel. Additional installation hardware is provided in an installation package and may or may not be used, depending on the application. Contents of the installation package are as follows:

PART NO.	DESCRIPTION	QUANTITY
4003080	NEMA compatible mounting kit	1 ea.
3003032	Power supply cables	2 sets
3003036	Flat cable clamp	2 ea.
	Panel mount connectors	4 ea.
	ac power cord	1 ea.
	Mounting screws	32 ea.

## 1-6. USER FURNISHED EQUIPMENT

The user furnished equipment for the iCS 80 Chassis depends on the requirements of the application. If the chassis is to be used in a microcomputer system, you must provide a dc power supply and a MULTIBUS-compatible microprocessor board. Some applications will require field wiring networks and an interface system to a microprocessor.

The advantage of using Intel's iCS 80 Chassis is that the chassis will readily accept the entire MULTIBUS-compatible single board computer product line.

A list of optional equipment that may be added to the iCS 80 Chassis includes:

- Up to two iSBC 614 Cardcage Assemblies.
- A maximum of 3 Intel single board computers; including the iSBC 80/05, 80/10, 80/20, 80/30, or 86/12.
- Signal conditioning/termination panels including the iCS 910, 920, and 930.
- One power supply; either the iSBC 635 or the iSBC 640.
- Any of the iSBC 711, 724, 732, 517, or 519 I/O interface modules.
- Any of the iSBC 104, 108, and 116 I/O expansion and memory modules.

## 1-7. SPECIFICATIONS

The specifications for the iCS 80 Chassis are listed in table 1-1.

Table 1-1. iCS 80 Chassis Specifications

PHYSICAL CHARACTERISTICS	
Height	43.5 cm (17.4 in.)
Width	48.5 cm (19.0 in.) at front panel 43.5 cm (17.4 in.) behind front panel
Depth	30.0 cm (12.0 in.) with all protrusions
Weight	16.8 Kg (37.0 lb.)

**Table 1-1. iCS 80 Chassis Specifications (Continued)**

ELECTRICAL CHARACTERISTICS	
Input Frequency	47-63 Hz
Input Voltage	100, 115, 215, or 230 Vac $\pm 10\%$
ENVIRONMENTAL CHARACTERISTICS	
Operating Temperature	0° to 50°C (32° to 122°F)
Non-operating Temperature	-40° to 85°C (-40° to 185°F)
Humidity	Up to 90%, non-condensing



### 2-1. INTRODUCTION

This chapter provides information on unpacking and inspection, installation, expansion, and MULTIBUS bus configuration. Familiarize yourself thoroughly with the contents of this chapter before applying power to the chassis.

### 2-2. UNPACKING AND INSPECTION

Inspect the shipping carton immediately upon receipt for evidence of mishandling during transit. If the shipping carton is severely damaged or waterstained, request that the carrier's agent be present when the carton is opened. If the carrier's agent is not present when the carton is opened and the contents of the carton are damaged, keep the carton and packing material for the agent's inspection.

For repairs to a product damaged in shipment, contact the Intel Technical Support Center to obtain a Return Authorization Number and further instructions. A purchase order will be required to complete the repair. A copy of the purchase order should be submitted to the carrier with your claim.

It is suggested that salvageable shipping cartons and packing material be saved for future use in the event the product must be shipped.

### 2-3. INSTALLATION CONSIDERATIONS

The iCS 80 Chassis is designed to mount onto a 19" RETMA rack or a NEMA enclosure. Figure 2-1 illustrates all relevant mounting and outline dimensions of the iCS 80 Chassis. Before mounting the chassis, familiarize yourself with the information in this chapter.

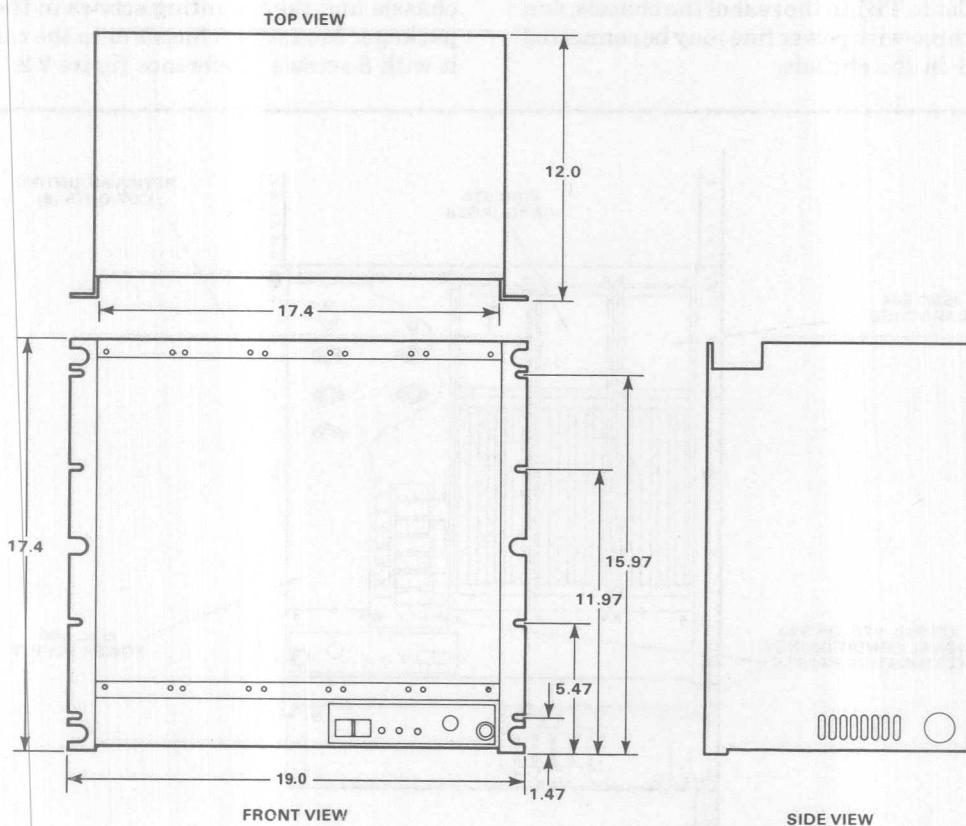


Figure 2-1. iCS 80 Chassis Dimensions (Inches)

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## 2-4. POWER REQUIREMENTS

As shipped from the factory, the iCS 80 Chassis requires 115 Vac at 47 to 63 Hz. Configuration of the shorting clips on TB1 inside the chassis allows 230 Vac operation at 47 to 63 Hz. The Intel iSBC 635 and iSBC 640 Power Supplies are designed for use with the iCS 80 Chassis and its options.

The Intel power supplies require one of the following four ac input voltages: 100, 115, 200, or 230, all at  $\pm 10\%$ , and within the frequency range of 47 to 63 Hz. More information on the Intel power supplies may be found in *iSBC 635 Power Supply Hardware Reference Manual*, Order No. 9800298, and in *iSBC 640 Power Supply Hardware Reference Manual*, Order No. 9800803.

### CAUTION

Ensure that the line voltage selection clip is positioned for the same voltage range configuration as the power supply. Failure to do so could result in damage to the equipment.

AC power is supplied to the iCS 80 Chassis in one of two methods: the ac power cord may be connected from an ac outlet to TB1 in the rear of the chassis, or a user-supplied three-wire power line may be connected directly to TB1 in the chassis.

As shipped, the iCS 80 Chassis is configured for 115 Vac operation with shorting clips on TB1 connecting pin 6 to 7 and pin 10 to 11. The modification for 230 Vac operation requires removal of the shorting clips connecting pin 6 to 7 and pin 10 to 11, and installation of a shorting clip between pins 8 and 9 on TB1.

## 2-5. COOLING REQUIREMENTS

The iCS 80 Chassis, with an iSBC 640 Power Supply, dissipates about 4.5 kilogram-calories of heat per minute following warmup. As options are added to the chassis, the heat dissipation will change. Figure the total heat dissipated on your system and supply adequate cooling to hold the ambient temperature of the chassis and options below 50°C (122°F). Care must be exercised during installation to prevent obstruction of the air flow openings on the chassis.

## 2-6. MOUNTING REQUIREMENTS

The chassis is designed for use in two types of mounting applications: 19" RETMA, and NEMA. All required mounting hardware is included in an installation package.

To mount the chassis onto a 19" RETMA rack, locate the 8 RETMA mounting slots on the front of the chassis and the mounting screws in the installation package. Mount the chassis onto the rack and secure it with 8 screws. Reference figure 2-2.

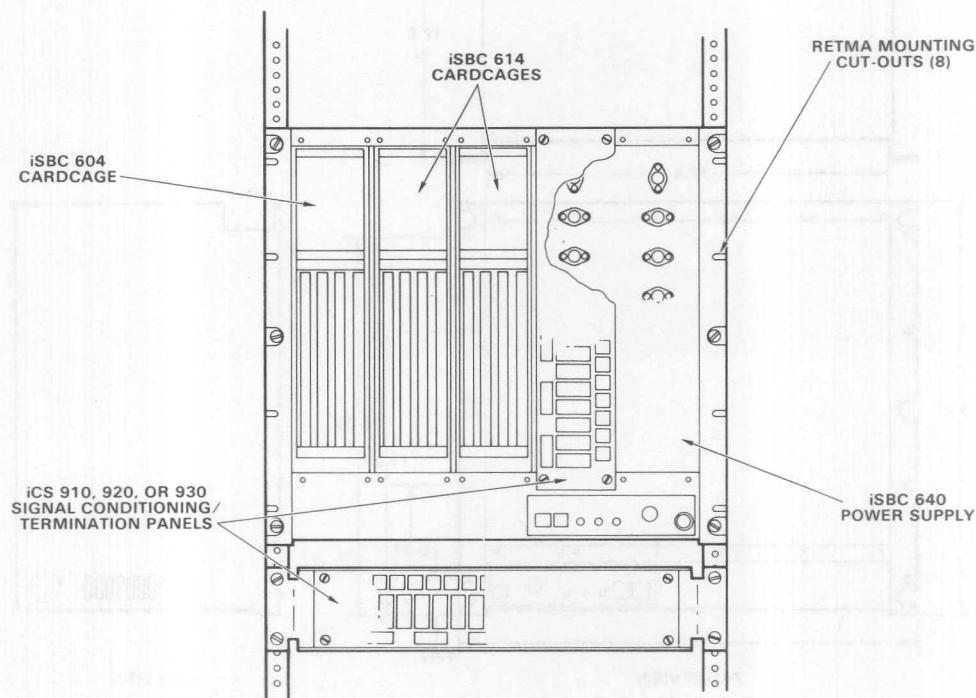


Figure 2-2. RETMA Rack Mounted Chassis

To mount the chassis into the NEMA enclosure, locate the NEMA mounting kit included in the installation package. Mount the brackets to the rear of the chassis as shown in figure 2-3, and then mount the assembly into the NEMA enclosure.

## 2-7. INSTALLATION SEQUENCE

The installation sequence outlined in the following text is suggested rather than required. The details required to perform each step are listed in subsequent paragraphs.

- Install the iSBC 604/614 Cardcage(s) into the iCS 80 Chassis.
- Install the iSBC 635 or 640 Power Supply into the iCS 80 Chassis.
- Insert the printed circuit boards (single board computers, I/O interface boards, etc.) into the cardcages.

- Mount the iCS 910, 920, and 930 Signal Conditioning/Termination Panels onto the System.

**2-8. CARD CAGE INSTALLATION.** The iSBC 604/614 Cardcage Assembly may be mounted with or without the use of an iCS 80 Chassis. If you choose to mount the cardcage separate from the chassis, reference the mounting instructions contained in the *iSBC 604/614 Cardcage Hardware Reference Manual* (9800708).

The iCS 80 Chassis comes equipped with one iSBC 604 Cardcage. To add more iSBC 614 Cardcages to the iCS 80 Chassis, use the following procedures:

### WARNING

Hazardous voltages are present in the iCS 80 Chassis when power is applied. Disconnect the ac power cord before proceeding any further.

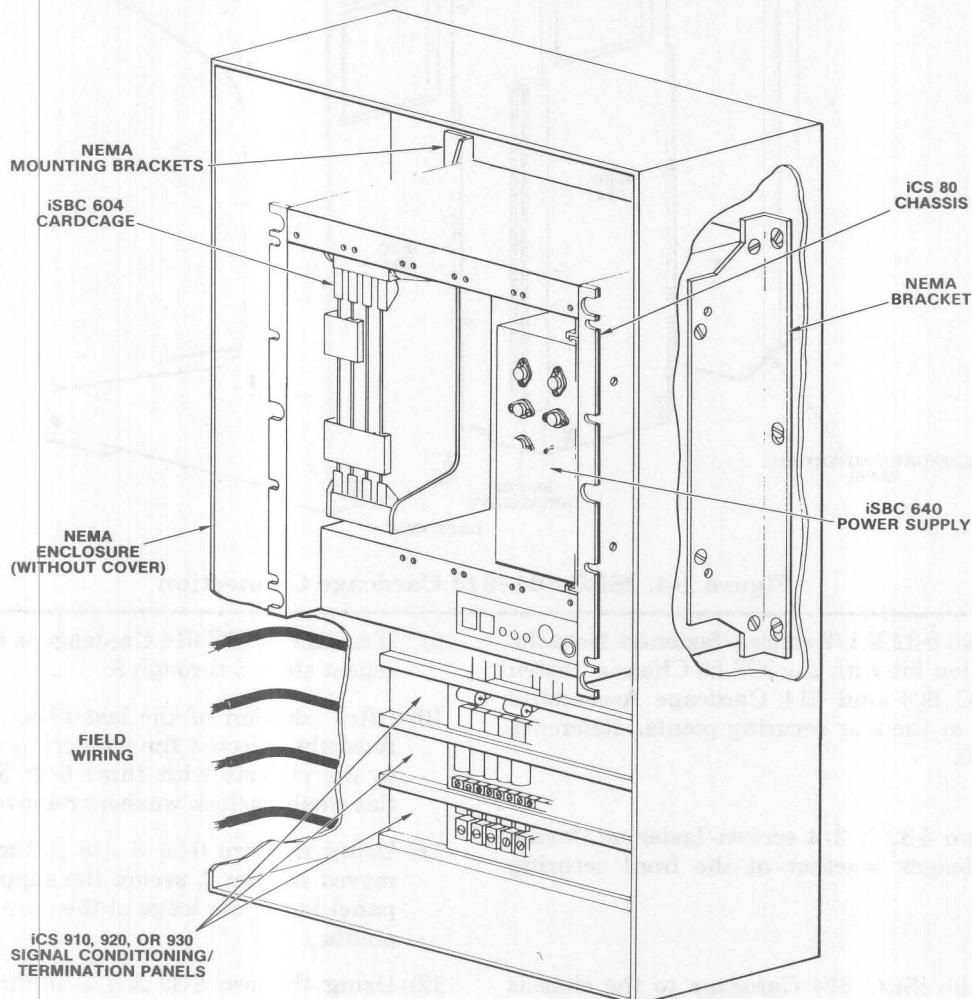
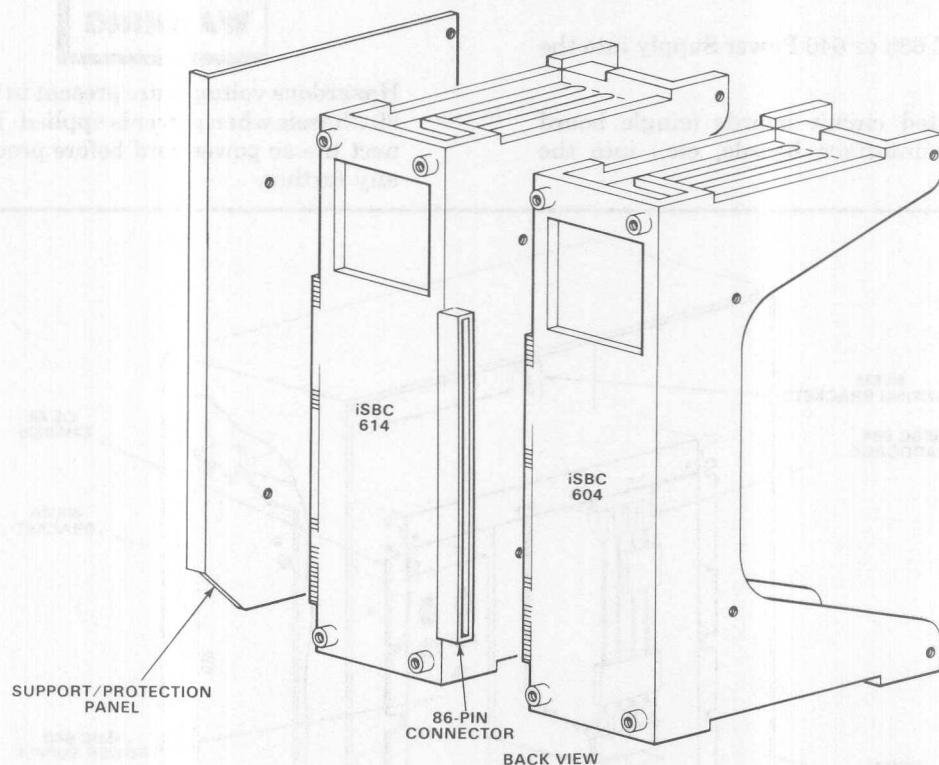


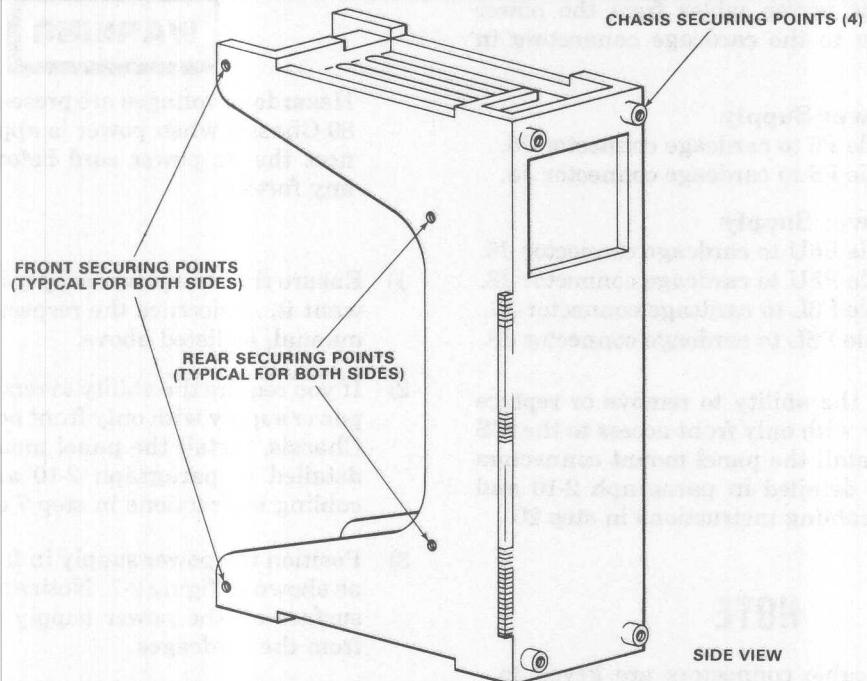
Figure 2-3. NEMA Enclosure - Mounted Chassis

- 1) Remove the perforated top cover from the chassis. Label and save the three 6-32 X 3/8 screws /flat washers/lock washers and the two 6-32 self-tapping screws/flat washers for later use. Disconnect the fan power cord from the fan.
- 2) Remove and label the four 6-32 flat head screws securing the metal support/protection panel to the cardcage.
- 3) Remove and label the three 6-32 X 3/8 screws/flat washers/lockwashers securing the support/protection panel to the iCS 80 Chassis.
- 4) Slide the support/protection panel away from the cardcage, so that the additional cardcage(s) may be installed.
- 5) From the top, insert the additional iSBC 614 Cardcage Assembly into the chassis and align it with the first cardcage. Seat the 86-pin plug (on the iSBC 604 Cardcage Assembly) into the 86-pin socket (on the iSBC 614 Cardcage Assembly). Figure 2-4 shows the connectors on the back of the cardcages.



**Figure 2-4. iSBC 604/614 Cardcage Connection**

- 6) Using two 6-32 X 1/2 screws/fasteners from the installation kit with the iCS 80 Chassis, fasten the iSBC 604 and 614 Cardcage Assemblies together at the rear securing points. Reference figure 2-5.
- 7) Using two 6-32 X 3/4 screws/fasteners, fasten the cardcages together at the front securing points.
- 8) Secure the iSBC 614 Cardcage to the chassis with four 6-32 self-tapping screws/flat washers from the installation kit. The chassis securing points are shown in figure 2-5.
- 9) If another iSBC 614 Cardcage is to be installed, repeat steps 5 through 8.
- 10) After addition of the last iSBC 614 Cardcage Assembly, secure the support/protection panel to the chassis with three 6-32 X 3/8 screws/flat washers/lock washers removed in step 3.
- 11) Using the two 6-32 X 3/8 flathead screws removed in step 2, secure the support/protection panel to the cardcage at the rear-most securing points.
- 12) Using the two 6-32 X 1/2 flathead screws removed in step 2, secure the support/protection panel to the cardcage at the front-most securing points.



**Figure 2-5. iSBC 604/614 Cardcage Securing Points**

- 
- |  |  |
|--|--|
| <p>13) Tighten the screws securing the support/protection panel.</p> <p>14) Remove and label the two 4-40 screws/fasteners securing the 60-pin connector to the cardcage.</p> <p>15) Remove the 60-pin connector from card slot J2A of the original cardcage and loosely mount it into the comparable location (card slot J2A) on the right-most cardcage.</p> | <p>18) Remove the wire connecting wirewrap post B to post N on the original cardcage. Reference figure 2-6A.</p> |
|--|--|
- 

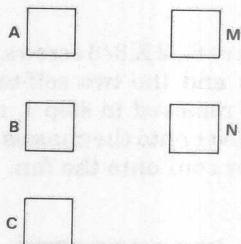
### NOTE

Ensure that the connector is mounted properly. The connector should be mounted so that the 3 wires (soldered to pins 28, 30, and 32 of the connector) are closest to the J3A cardslot in the cardcage.

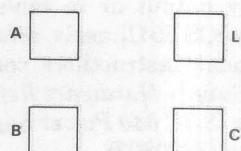
### CAUTION

Mount the connector loosely. If the screws securing the connector are too tight, the printed circuit boards may seat improperly into the connector or may be damaged.

- 
- |  |   |
|--|---|
| <p>16) Insert the processor board into the J2 card slot of the right-most cardcage. Seat the edge connector on the board into the 60-pin and 86-pin connectors mounted in the rear of the J2 card slot.</p> <p>17) Tighten the screws holding the 60-pin connector to the J2A card slot in the cardcage.</p> | <p>19) Install a wire connecting wirewrap post B to post L on the right-most cardcage. Reference figure 2-6B. More information is available in the <i>MULTIBUS Interfacing Application Note, AP-28</i>.</p> |
|--|---|
- 



**Figure 2-6A. iSBC 604 Cardcage Wirewrap Posts**



**Figure 2-6B. iSBC 614 Cardcage Wirewrap Posts**

- 20) Connect the dc power cables from the power supply directly to the cardcage connectors in this order:

**iSBC 635 Power Supply**

Power cable P6 to cardcage connector J6.  
Power cable P8 to cardcage connector J8.

**iSBC 640 Power Supply**

Power cable P6U to cardcage connector J6.  
Power cable P8U to cardcage connector J8.  
Power cable P6L to cardcage connector J6.  
Power cable P8L to cardcage connector J8.

- 21) If you require the ability to remove or replace a power supply with only front access to the iCS 80 Chassis, install the panel mount connectors and cables as detailed in paragraph 2-10 and disregard the cabling instructions in step 20.

**NOTE**

The power cable connectors are keyed to prevent incorrect installation. If the connectors do not mate readily, check the key.

- 22) Route the power supply cables through the cable clamps located in the inside lower rear of the chassis.
- 23) Using the three 6-32 X 3/8 screws/lock washers/flat washers and the two self-tapping screws/flat washers removed in step 1, replace the perforated top cover onto the chassis and re-connect the fan power cord onto the fan.

**CAUTION**

Ensure that the output of your power supply is sufficient to handle the power requirements of your expanded system.

**2-9. POWER SUPPLY INSTALLATION.** Intel offers two power supplies as options to the iCS 80 System; the iSBC 635, and the iSBC 640. To adjust the power supply output or to mount these units separate from the iCS 80 Chassis, refer to the mounting and adjustment instructions contained in the *iSBC 635 Power Supply Hardware Reference Manual* (9800298) and the *iSBC 640 Power Supply Hardware Reference Manual* (9800803).

To mount the iSBC 635 or 640 Power Supply into the iCS 80 Chassis, use the following procedures:

**WARNING**

Hazardous voltages are present in the iCS 80 Chassis when power is applied. Disconnect the ac power cord before proceeding any further.

- 1) Ensure that the power supply is optioned as you want it. Reference the respective power supply manual, as listed above.
- 2) If you require the ability to remove or replace the power supply with only front access to the iCS 80 Chassis, install the panel mount connectors as detailed in paragraph 2-10 and disregard the cabling instructions in step 7 of this procedure.
- 3) Position the power supply in front of the chassis as shown in figure 2-7. Notice that the mounting surface on the power supply is oriented away from the cardcages.
- 4) Locate the slide on the top and bottom of the power supply mounting plate and the guide counter-parts mounted on the top and bottom of the chassis.
- 5) Slowly move the power supply back into the iCS 80 Chassis, and fit the two slides on the power supply to the inside of the two guides on the chassis.
- 6) Connect the ac power connector (J2) from the power supply to connector P2 inside the chassis.
- 7) Route the power supply cables out through the rear of the chassis and connect them in this order:

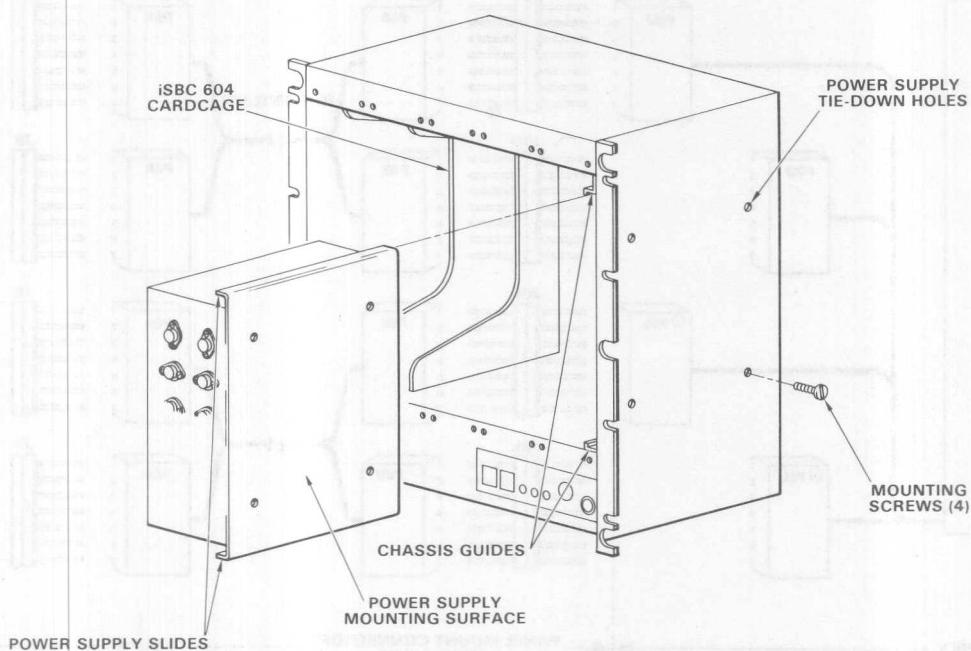
Power cable P6 to cardcage connector J6.

Power cable P8 to cardcage connector J8.

- 8) To complete the installation, secure the power supply. Insert four 10-24 screws, included in the installation package, through the holes in the right end of the chassis and screw them into the power supply. If quick removal of the power supply is desired, the four screws may be omitted.

**NOTE**

The iSBC 635 Power Supply includes one set of power cables which may be connected directly to the cardcage. The iSBC 640 Power Supply uses two sets of power cables; one set for the cardcage situated on the left end and one set for the cardcage on the right end of the iCS 80 Chassis. Two sets of power supply extension cables are provided in the installation package and used if the panel mount connectors are required.



**Figure 2-7. Power Supply Mounting**

**2-10. PANEL MOUNT CONNECTOR INSTALLATION.** Installation of the panel mount connectors into the iCS 80 Chassis is optional. The four panel mount connectors are included in the installation kit to provide a convenient method for replacing or removing a power supply in an iCS 80 Chassis. When installed, the panel mount connectors allow power supply cable connection/disconnection with only front access to the iCS 80 Chassis. If the back of the iCS 80 Chassis is readily accessible after installation, you may choose not to use the panel mount connectors.

When installed, the panel mount connectors and the two sets of power cables from the installation kit will interface the power from the power supply (P6 and P8) to the cardcages (J6 and J8). The connector and cable installation procedure is as follows:

### **WARNING**

Hazardous voltages are present in the iCS 80 Chassis when power is applied. Disconnect the ac power cord before proceeding any further.

- 1) Locate the four panel mount connectors and the two extension cable sets included in the installation kit.
- 2) On each panel mount connector, cut off both sides of one of the outside pins, as the dashed lines show in figure 2-8.

- 3) Locate the four rectangular mounting holes beneath the power supply mounting area, and label them P6U, P8U, P6L, and P8L.
- 4) Push each connector into a mounting hole until the flanges on the connector seat securely. Mount the J6 panel mount connectors so that the removed pin is at the bottom, and mount the J8 connectors so that the removed pin is at the top.

### **NOTE**

The panel mount connectors may be inserted from either direction, however, the suggested method is to insert them from the rear of the chassis.

- 5) Ensure that the panel mount connectors are seated securely, and install the cables between the panel mount connectors and the cardcages as shown in figure 2-8.
- 6) Connect the power supply output cables, one set with an iSBC 635 and two sets with an iSBC 640 Power Supply, to the panel mount connectors as shown in figure 2-8.

### **NOTE**

The power supply cable connectors (P6 and P8) are keyed such that pin 7 of J6 must be removed and pin 1 of J8 must be removed in order for the connectors to mate properly.

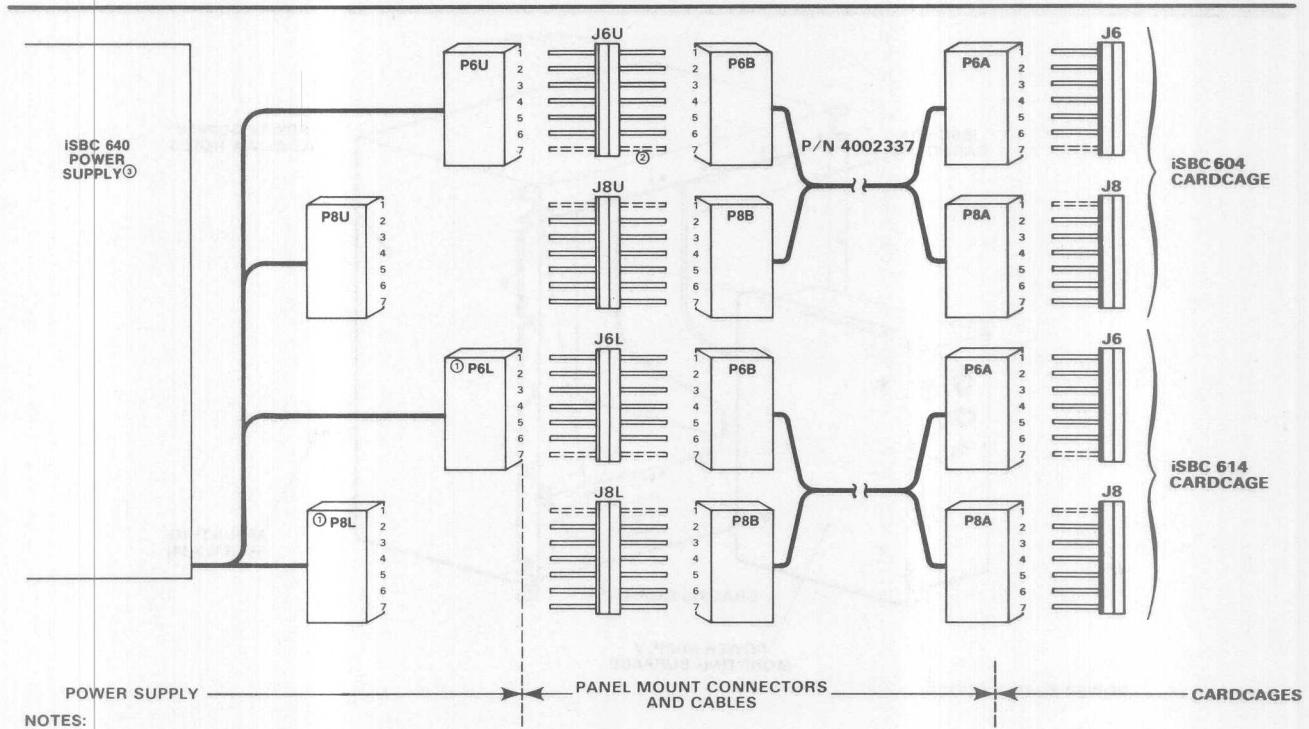


Figure 2-8. Power Connections at the Panel Mount Connectors

**2-11. SIGNAL CONDITIONING/TERMINATION PANEL INSTALLATION.** The iCS 910, 920, and 930 Signal Conditioning/Termination Panels are designed to mount onto the iCS 80 Chassis, to mount onto a 19" RETMA rack, or to mount independently, as required by the application.

To mount the units independently or on a 19" RETMA rack, reference the mounting instructions in the respective Signal Conditioning/Termination Panel Hardware Reference Manual.

Each signal conditioning/termination panel includes an installation kit containing screws, hex standoffs, cables, a RETMA mounting bracket, and a clear plastic cover to protect the board.

To mount the iCS 910, 920, and 930 Signal Conditioning/Termination Panels onto the iCS 80 Chassis, use the following procedure:

### WARNING

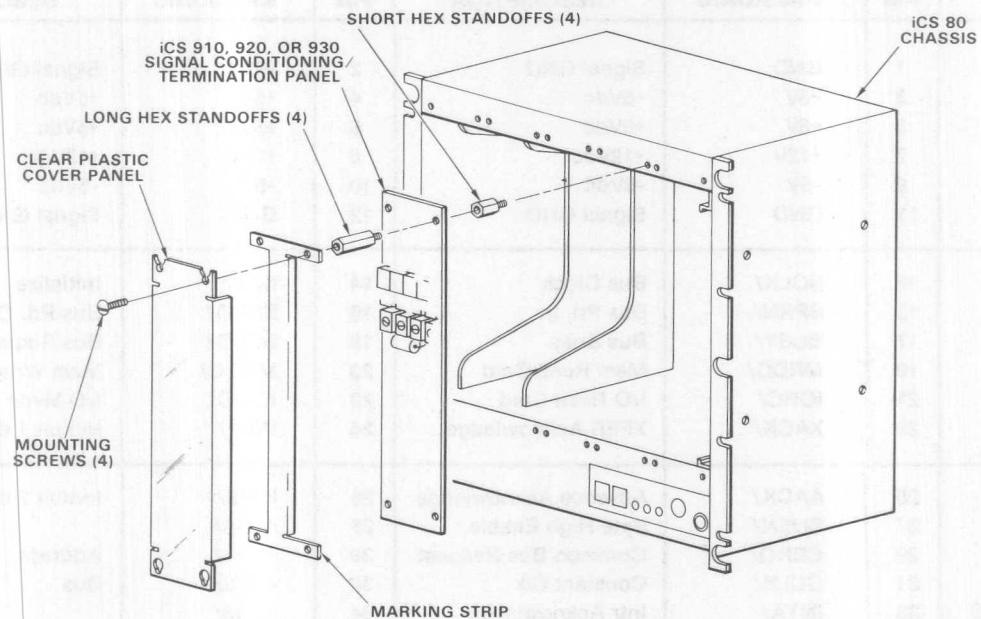
Hazardous voltages are present in the iCS 80 Chassis when power is applied. Disconnect the ac power cord before proceeding any further.

- 1) Locate the four shorter hex male/female standoffs included in the installation kit provided with the signal conditioning/termination panel.
- 2) Secure the four standoffs to the front of the iCS 80 Chassis; two on the top and two on the bottom. Reference figure 2-9.
- 3) Mount the iCS 910, 920, and 930 Signal Conditioning/Termination Panels onto the hex standoffs. Using four screws supplied with each panel, secure the panels to the hex standoffs.

### NOTE

If filler panels are mounted on the chassis, you must remove them before installing the signal conditioning/termination panels. Included in the installation kit is an optional marking strip, plastic cover, and long standoffs that may be installed as shown in figure 2-9.

- 4) Connect the field wiring network to the panels. Flat 50-pin connector cables are supplied with the termination panels.



**Figure 2-9. Signal Conditioning/Termination Panel Installation**

## 2-12. MULTIBUS DESCRIPTION

The iCS 80 Chassis is equipped with the iSBC 604 Cardcage/Backplane. This cardcage accommodates up to four iSBC boards and has an extension plug for attachment to additional external cardcages. The backplane conforms to the Intel MULTIBUS specification. These signals and pin numbers are referenced in table 2-1. Some Intel single board computers use connector P2 for additional signals and battery backup. These assignments are listed in table 2-2.

## 2-13. MULTIBUS PRIORITY

The iCS 80 Chassis may be used with master boards in either a serial or parallel priority scheme. A master board is defined as a board which is capable of acquiring and controlling the MULTIBUS bus structure. One of the two priority methods must be implemented, or the boards in the cardcage will not interact.

In the serial method, priority is resolved by board placement. Slot J2 (right-most slot) has the highest priority and J5 the lowest. To implement this method, a jumper must be installed between wire-wrap posts B and N on the etch side of the backplane. This is illustrated in figure 2-10. In this scheme, a maximum of three master boards may be used.

To initiate a parallel priority scheme, a priority resolver network is required. Boards such as the iSBC 80/20, 80/30, and 86/12 may use this network. A typical hookup of this type is shown in figure 2-11.

Additional information on the MULTIBUS may be obtained from the *MULTIBUS Application Note, AP-28*.

Table 2-1. MULTIBUS Connector (P1) Pin Assignment

	(COMPONENT SIDE)			(CIRCUIT SIDE)		
	PIN	MNEMONIC	DESCRIPTION	PIN	MNEMONIC	DESCRIPTION
POWER SUPPLIES	1	GND	Signal GND	2	GND	Signal GND
	3	+5V	+5Vdc	4	+5V	+5Vdc
	5	+5V	+5Vdc	6	+5V	+5Vdc
	7	+12V	+12Vdc	8	+12V	+12Vdc
	9	-5V	-5Vdc	10	-5V	-5Vdc
	11	GND	Signal GND	12	GND	Signal GND
BUS CONTROLS	13	BCLK/	Bus Clock	14	INIT/	Initialize
	15	BPRN/	Bus Pri. In	16	BPRO/	Bus Pri. Out
	17	BUSY/	Bus Busy	18	BREQ/	Bus Request
	19	MRDC/	Mem Read Cmd	20	MWTC/	Mem Write Cmd
	21	IORC/	I/O Read Cmd	22	IOWC/	I/O Write Cmd
	23	XACK/	XFER Acknowledge	24	INH1/	Inhibit 1 disable RAM
INTERRUPTS	25	AACK/	Advance Acknowledge	26	INH2/	Inhibit 2 disable ROM
	27	BHEN/	Byte High Enable	28	AD10/	
	29	CBRQ/	Common Bus Request	30	AD11/	Address
	31	CCLK/	Constant Clk	32	AD12/	Bus
	33	INTA/	Intr Acknowledge	34	AD13/	
	35	INT6/	Parallel	36	INT7/	Parallel
	37	INT4/	Interrupt	38	INT5/	Interrupt
	39	INT2/	Requests	40	INT3/	Requests
	41	INT0/		42	INT1/	
ADDRESS	43	ADRE/		44	ADRF/	
	45	ADRC/		46	ADRD/	
	47	ADRA/	Address Bus	48	ADRB/	Address
	49	ADR8/		50	ADR9/	
	51	ADR6/		52	ADR7/	
	53	ADR4/		54	ADR5/	
	55	ADR2/		56	ADR3/	
	57	ADR0/	58	ADR1/		
DATA	59	DATE/		60	DATF/	
	61	DATC/		62	DATD/	
	63	DATA/	Data Bus	64	DATB/	Data
	65	DAT8/		66	DAT9/	
	67	DAT6/		68	DAT7/	
	69	DAT4/		70	DAT5/	
	71	DAT2/		72	DAT3/	
	73	DAT0/		74	DAT1/	
POWER SUPPLIES	75	GND	Signal GND	76	GND	Signal GND
	77	-10V <sup>2</sup>	-10Vdc	78	-10V <sup>2</sup>	-10Vdc
	79	-12V	-12Vdc	80	-12V	-12Vdc
	81	+5V	+5Vdc	82	+5V	+5Vdc
	83	+5V	+5Vdc	84	+5V	+5Vdc
	85	GND	Signal GND	86	GND	Signal GND

## Notes:

<sup>1</sup> ADR0/ is equivalent to BLEN (positive true) when used on 16 bit systems.<sup>2</sup> Not used on MULTIBUS bus structure.

Table 2-2. P2 Connector Pin Assignment

(COMPONENT SIDE)		(CIRCUIT SIDE) DESCRIPTION	PIN	MNEMONIC	DESCRIPTION
PIN	MNEMONIC				
1	GND	Signal GND	2	GND	Signal GND
3	5VB	+5V Battery	4	5VB	+5V Battery
5	Reserved		6	Reserved	
7	-5VB	-5V Battery	8	-5VB	-5V Battery
9	PUPO/	Pulsed Power Off	10	Reserved	
11	12VB	+12V Battery	12	12VB	+12V Battery
13	PFSR/	Power Fail Sense Reset	14	Reserved	
15	-12VB	-12V Battery	16	-12VB	-12V Battery
17	PFSN/	Power Fail Sense	18	ACLO	AC Low
19	PFIN/	Power Fail Interrupt	20	MPRO/	Memory Protect
21	GND	Signal GND	22	GND	Signal GND
23	+15V	+15V	24	+15V	+15V
25	-15V	-15V	26	-15V	-15V
27			28	HALT/	Bus Master HALT
29			30	WAIT/	Bus Master WAIT STATE
31			32	ALE	Bus Master ALE
33			34	Reserved	
35			36	Reserved	
37			38	RESET/	Reset Switch
39			40		
41	Reserved		42		
43			44		
45			46	Reserved	
47			48		
49			50		
51			52		
53			54		
55			56		
57			58		
59			60		

Notes:

1. If possible, on slave boards, PFIN should be connected to INT0/.
2. All undefined pins are reserved for future use.

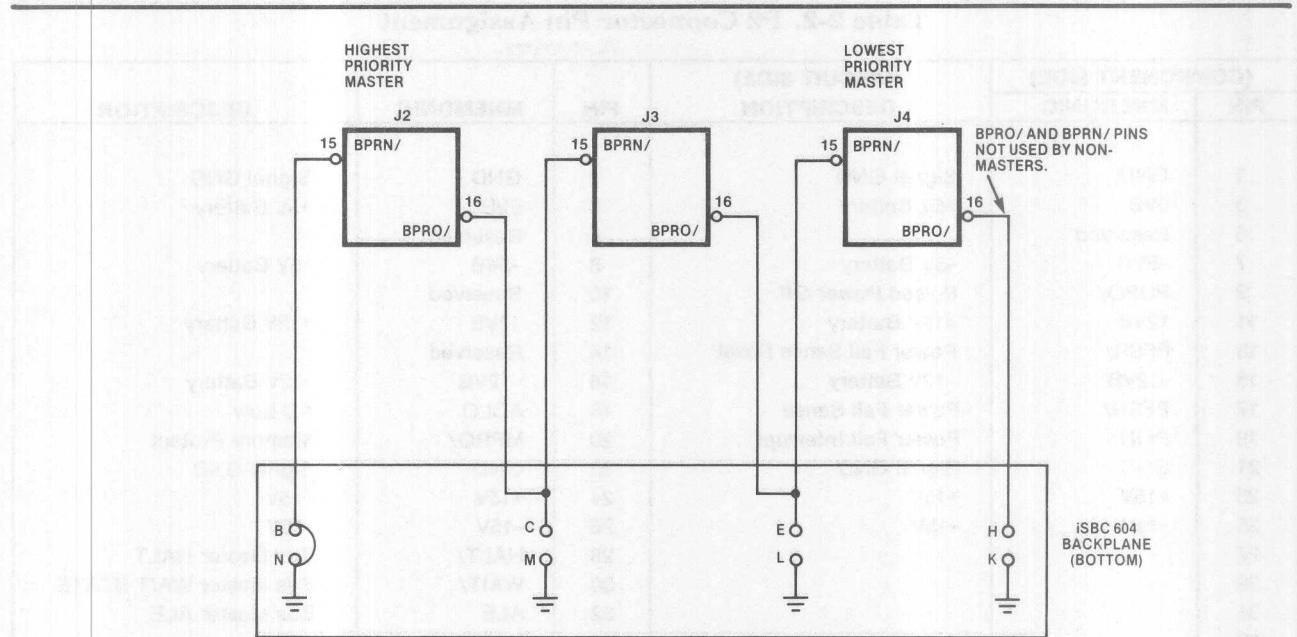


Figure 2-10. Serial Priority

799-7

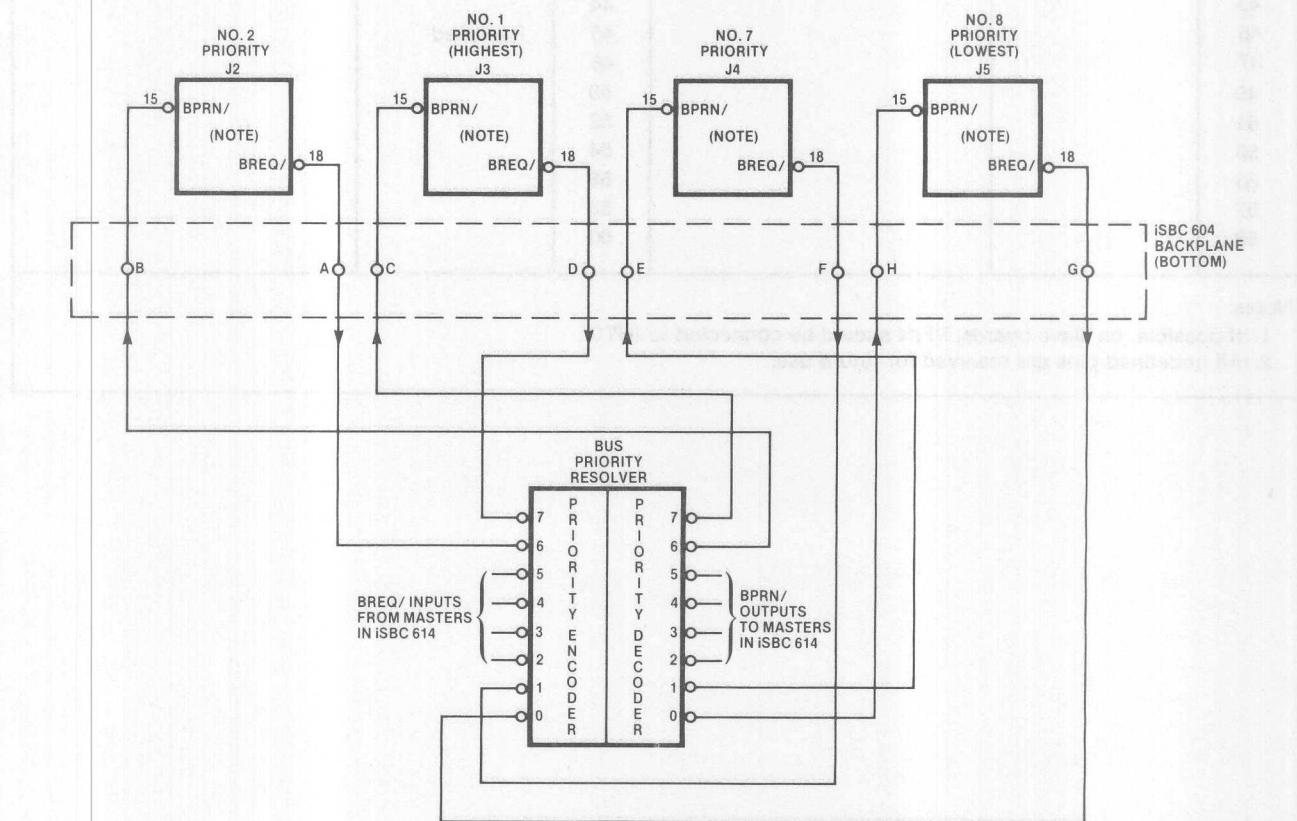


Figure 2-11. Parallel Priority

799-8



## CHAPTER 3

# PRINCIPLES OF OPERATION

### 3-1. INTRODUCTION

This chapter describes the functional operation of the iCS 80 Chassis. Most of the information in this chapter deals with the control panel operation. Since the chassis does not include a power supply, the text contains no discussion of power supply usage. However, power supply information may be found in the manual supplied with the power supply.

### 3-2. FUNCTIONAL DESCRIPTION

The major components of the iCS 80 Chassis include a control panel, an iSBC 604 Cardcage Assembly, four fans, a line voltage select jumper, and a cardcage support/protection panel. The following paragraphs describe each of these components.

### 3-3. CONTROL PANEL

The control panel includes three switches, three indicators, a fuse, and a printed circuit board (PCB) containing the required front panel logic.

The power OFF/ON/LOCK switch (S1) is mounted on the right side of the control panel and operated with a key. In the ON position, the switch allows user intervention via the INTERRUPT and RESET switches. In the LOCK position, no intervention is allowed from the control panel. They key may only be removed when turned to the OFF or LOCK position.

The INTERRUPT switch (S2) is a momentary contact type. When activated, the switch generates an INT1/ signal from the control panel PCB. INT1/ is wired to pin 42 of the backplane.

#### NOTE

You may have to add or change the interrupt jumpers on some iSBC microcomputer boards (80/20, 80/30, 86/12) to allow them to recognize the INT1/ signal on pin 42. Jumper wiring information is contained in the respective iSBC microcomputer hardware reference manual.

The RESET switch (S1) is a momentary control type. When activated, it generates the RESET/ signal from the control panel PCB. RESET/ is connected to pin 14 of the backplane and used to reset the system.

The POWER ON indicator is simply a green light emitting diode used to monitor the +5V power. The indicator illuminates when power is ON.

The HALT and RUN indicators are red and green light emitting diodes that work together, depending on the state of three signals: WAIT/, HALT/, and ALE.

#### NOTE

The HALT and RUN indicators are not useable with an iSBC 80/10A microprocessor in the system; the iSBC 80/10A does not generate the WAIT/, HALT/, or ALE signals.

The RUN indicator illuminates whenever the CPU is executing an instruction. With the CPU in a WAIT state, neither the RUN nor the HALT indicator is illuminated.

The HALT indicator illuminates after the CPU executes a halt instruction. A control panel RESET or an INTERRUPT will remove the halt state.

The fuse (F1) is mounted on the right side of the control panel. A 6 ampere fuse is required for 115 Vac operation and 3 ampere for 230 Vac operation.

The control panel printed circuit board is mounted inside the chassis directly behind the control panel, and contains the required circuitry for the control panel.

### 3-4. iSBC 604 CARDAGE ASSEMBLY

The cardcage houses a maximum of four iSBC boards. Considered part of the cardcage, the backplane is a printed circuit motherboard which supplies MULTIBUS signals to all 86-pin connectors attached. Operating voltages reach the boards via the backplane and all interboard communications occur on the MULTIBUS bus structure. Signal terminator resistors are located on the backplane.

An additional connector, J2A, is installed on the backplane to accommodate several optional status signals and auxiliary RAM power.

### 3-5. FANS

The chassis contains four fans for cooling purposes.

Three small fans are installed on the bottom of the chassis below the three iSBC 604/614 Cardcage mounting positions. An additional fan may be installed into the bottom of the chassis. Air flow is directed upward through each of the cardcages.

A larger fan is secured to the top of the chassis directly above the power supply mounting area. Again, air flow is directed upward.

### 3-6. LINE VOLTAGE SELECT JUMPER AND LINE FILTER

The hardware used for line voltage selection is mounted onto the inside of the drop-down panel on the back of the iCS 80 Chassis. Normal "as-shipped" configuration for 115 Vac operation includes jumpers on TB1, connecting pin 1 to 2, 6 to 7, and 10 to 11. The

unit may be modified for 230 Vac operation by inserting a jumper connecting pin 8 to 9, and deleting the jumpers connecting pin 6 to 7, and 10 to 11 on the TB1 barrier strip.

The line filter is mounted inside the chassis, below the power supply mounting area, and is used to filter the ac input.

### 3-7. SUPPORT/PROTECTION PANEL

The cardcage support/protection panel serves to protect the outer-most printed circuit board in the cardcage and to secure the right end of the iSBC 604/614 Cardcage Assembly. The panel is moveable, depending on the number of cardcages, and secured to both the chassis and the right-most cardcage.



## CHAPTER 4

# SERVICE INFORMATION

### 4-1. INTRODUCTION

This chapter contains service and repair assistance instructions, removal and replacement information, and service diagrams.

### 4-2. SERVICE AND REPAIR ASSISTANCE

United States customers can obtain service and repair assistance from Intel by contacting the MCSD Technical Support Center in Santa Clara, California at one of the following numbers:

#### Telephone:

- From Alaska or Hawaii call —  
(408) 987-8080
- From locations within California call toll free —  
(800) 672-3507
- From all other U.S. locations call toll free —  
(800) 538-8014

#### TWX:

910-338-0029 or 910-338-0255

#### TELEX:

34-6372

Always contact the MCSD Technical Support Center before returning a product to Intel for service or repair. You will be given a "Repair Authorization Number", shipping instructions, and other important information which will help Intel provide you with fast, efficient service. If the product is being returned because of damage sustained during shipment from Intel, or if the product is out of warranty, a purchase order is necessary for the MCSD Technical Support Center to initiate the repair.

In repairing the product for shipment to the MCSD Technical Support Center, use the original factory packaging material, if available. If the original packaging is not available, wrap the product in a cushioning material such as Air Cap TH-240 (or equivalent) manufactured by the Sealed Air Corporation, Hawthorne, N.J., and enclose in a heavy-duty corrugated shipping carton. Seal the carton securely, mark it "FRAGILE" to ensure careful handling, and ship it to the address specified by MCDS Technical Support Center personnel.

### NOTE

Customers outside of the United States should contact their sales source (Intel Sales Office or Authorized Intel Distributor) for directions on obtaining service or repair assistance.

### 4-3. REMOVAL AND REPLACEMENT

The removal and replacement of most components in the iCS 80 Chassis is obvious. Only those procedures that are critical, or are not considered obvious will be discussed in this section.

### 4-4. CARDAGE ASSEMBLY REMOVAL

To remove the cardage, proceed as follows:

- a) Disconnect the ac power from the iCS 80 Chassis.
- b) From the front of the chassis, remove the four screws securing the cardage to the support/protection panel, and unplug the 86-pin connector from the cardage.
- c) With a multiple cardage system, remove the four screws securing the cardage to the next sequential cardage assembly.
- d) From the rear of the chassis, disconnect the power connectors on the cardage and label them.

### NOTE

Some configurations may not have power connectors on all cardage assemblies.

- e) From the front, slide the cardage out of the chassis.

### 4-5. POWER SUPPLY REMOVAL

If the Intel iSBC 635 or iSBC 640 Power Supply is installed in the iCS 80 Chassis, remove it as follows:

- a) Unplug the ac power cord for the iCS 80 Chassis.
- b) From the right end of the chassis, remove the four 6-32 screws securing the power supply to the end of the chassis.

- c) Disconnect the ac input power connector P2 from connector J2.
- d) Disconnect the power cables (P6 and P8) from the cardcage or from the panel mount connectors, depending on the configuration.

### NOTE

The iSBC 635 Power Supply requires disconnecting one set of cables; the iSBC 640 requires disconnecting two sets of cables.

- e) Finally, slide the power supply out through the front of the chassis until removed.

### 4-6. SERVICE DIAGRAMS

The iCS 80 Chassis service diagrams are included as figures 4-1 thru 4-5. A signal mnemonic that ends with a slash (/) denotes active low ( $\leq 0.4V$ ) signal. Conversely, a signal mnemonic without a slash denotes an active high ( $\geq 2.4V$ ) signal.

### 4-7. REPLACEMENT PARTS LISTING

Table 4-1 lists the replacement parts for the iCS 80 Chassis. The table is grouped according to chassis modules. Abbreviations used in the parts listing are identified in table 4-2. Note that the iSBC 604/614 Cardcage Assembly replacement parts listing is contained in the Service Information section of the *iSBC 604/614 Cardcage Hardware Reference Manual*, Order No. 9800708.

**Table 4-1. Replacement Parts Listing**

Figure & Index No.	Description	Part No.	Mfr. Code	Qty.
4-1	Basic Chassis Assembly			
1	Assy, Cardcage	4000681	Intel	1
2	Assy, Fan Cord	4003024	Intel	1
3	Assy, Harness	4002354	Intel	1
4	Assy, Fan Cord, top	4003033	Intel	1
5	Support, Cardcage Side	3003028	Intel	1
6	Weldment, Chassis	3003030	Intel	1
7	Cover, top	3003027	Intel	1
8	Duct, Fan Mounting	3003029	Intel	1
9	Bracket, Terminal Block	3002352	Intel	1
10	Bracket, Keylock Switch	3002450	Intel	1
11	Cover, Component	3003026	Intel	1
12	Panel, Filler	3002347	Intel	3
13	Overlay, Control Panel	3003037	Intel	1
16	Support, Front Panel	3003031	Intel	1
22	Keylock Cylinder (S1)	10250T-15233	CUT	1
23	Contact Block	10250T-42	CUT	1
25	Connector, AC receptacle (J10)	EAC-301	SWI	1
26	Line Filter (FL1)	10B1	COR	1
28	Fuse Holder (F1)	342Q12	LIT	1
29	Fuse, 6 Amp, 250 S.B.	OBD	CML	1
31	Fan, Sprite 37 CFM	SUZA3	ROT	3
32	Fan, Muffin 105 CFM	MUZAI-028021	ROT	1
39	Jumper, Terminal	601-J	KUL	5
40	Block, Terminal, 12 position (TB1)	601-12	KUL	1
4-3	Display Printed Wiring Assembly	1002293	Intel	1
	Monostable Multivibrator (A1)	9602	FAI	1
	Quad 2 input NAND, Open collector, 7438 (A2, A3, A4)	SN7438	TI	3
	Resister, 220 ohm, 1/4 W, 5% (R22)	OBD	CML	1
	Resistor, 240 ohm, 1/4 W, 5% (R19, 20, 21)	OBD	CML	3
	Resistor, 2.2 K, 1/4 W, 5% (R3-18)	OBD	CML	16
	Resistor, 33 K, 1/4 W, 5% (R1)	OBD	CML	1
	Resistor, 560 K, 1/4 W, 5% (R2)	OBD	CML	1
	Transistor, 2N3904 (Q1)	2N3904	TI	1
	Diode, LED green, 35 mA, 3V (DS2, 3)	OBD	CML	2

**Table 4-1. Replacement Parts Listing (Cont.)**

<b>Figure &amp; Index No.</b>	<b>Description</b>	<b>Part No.</b>	<b>Mfr. Code</b>	<b>Qty.</b>
	Diode, LED red, 35 mA, 3V (DS1)	OBD	CML	1
	Capacitor, tant., $4.7\mu F$ , 10V $\pm 10\%$ (C2)	OBD	CML	1
	Capacitor, Cer., $.01\mu F$ , 25V $\pm 80\%$ (C3-6)	OBD	CML	4
	Capacitor, Cer., $.33\mu F$ , 50V $\pm 80\%$ (C1)	OBD	CML	1
	Switch, momentary (S1, S2)	2X17.5-FA110-BLK-2UOA	SCH	2
	Connector, right angle, 12 pin (J2)	KK-156-09-66-1121	MOL	1
	Connector, 4 pin (J1)	2597A-4-KT53-KT54	KUL	1
	Fuse Clip (F1)	102068	LIT	2
	Panel Mount Connectors, four, M-M	09-10-1075	MOL	4

**Table 4-2. Manufacturers Codes**

<b>MFR. CODE</b>	<b>Manufacturer</b>	<b>Address</b>	<b>MFR. CODE</b>	<b>Manufacturer</b>	<b>Address</b>
COR	CORCOM, Inc.	Chicago, IL	MOL	Molex	Lisle, IL
CUR	Curtis Industries, Inc.	Milwaukie, WI	ROT	Rotron	Woodstock, NY
CUT	Cutler Hammer	Milwaukie, WI	SCH	Schadow Switch, Inc.	Eden Prairie, Mn
FAI	Fairchild Semiconductor	Mountain View, CA	SWI	Switchcraft, Inc.	Chicago, IL
INTEL	Intel	Santa Clara, CA	TI	Texas Instruments	Dallas, TX
KUL	Kulka	Mt. Vernon, NY	CML	Any Commercial Source; Order by Description (OBD)	
LIT	Littlefuse Co.	Des Plains, IL			

## iCS 80 Chassis

## Service Information

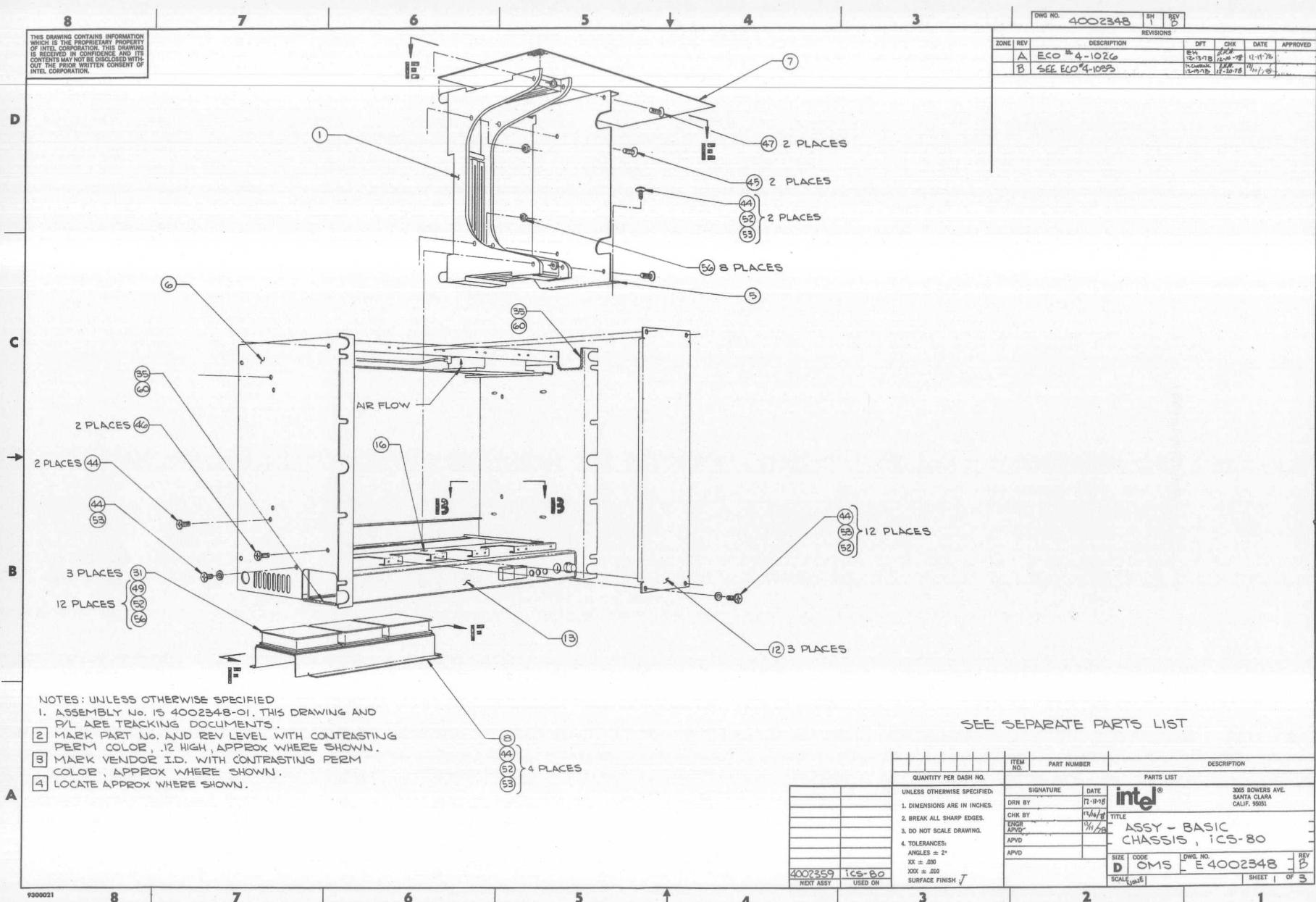
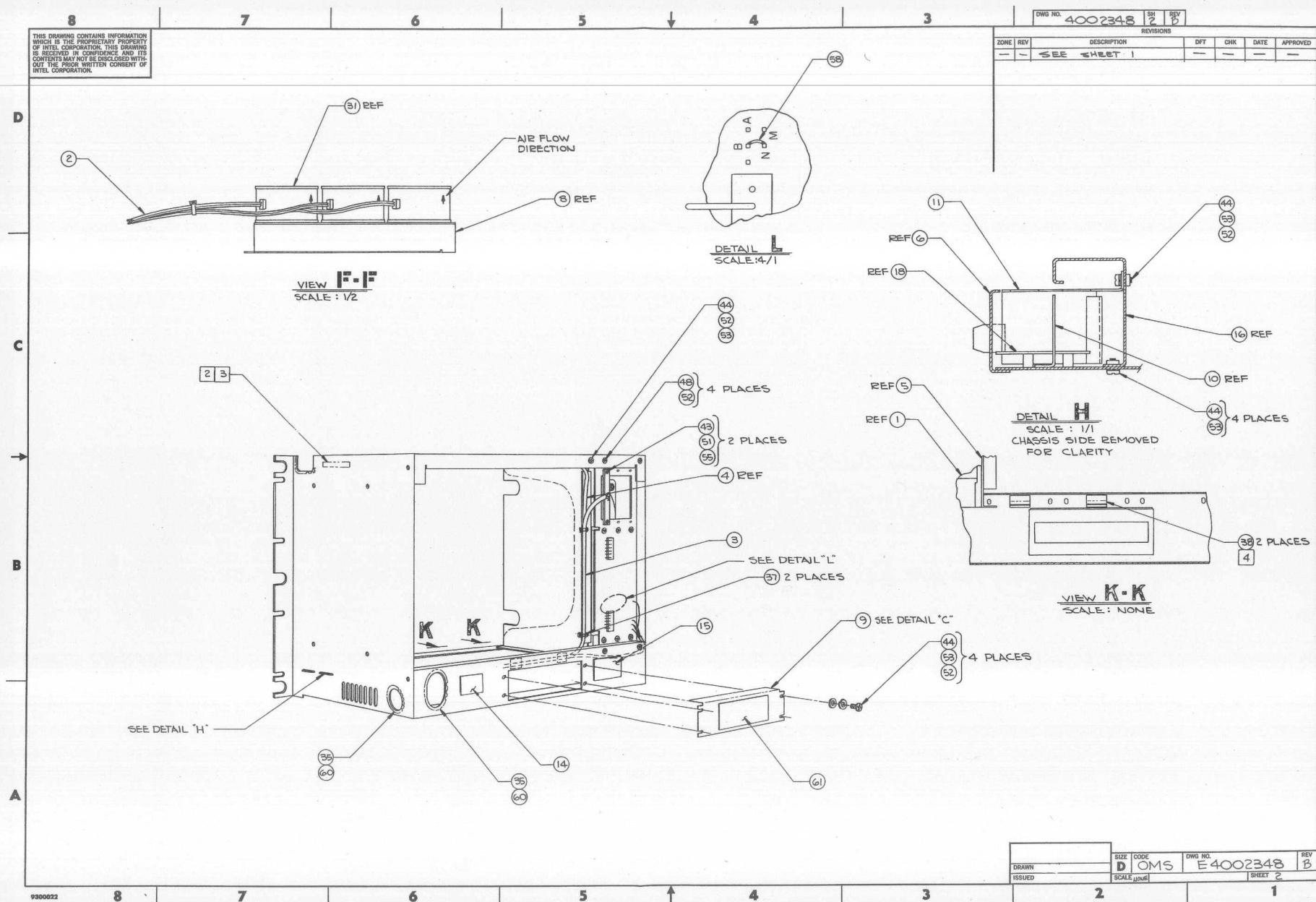


Figure 4-1. iCS 80 Chassis Assembly (Sheet 1 of 3)

iCS 80 Chassis

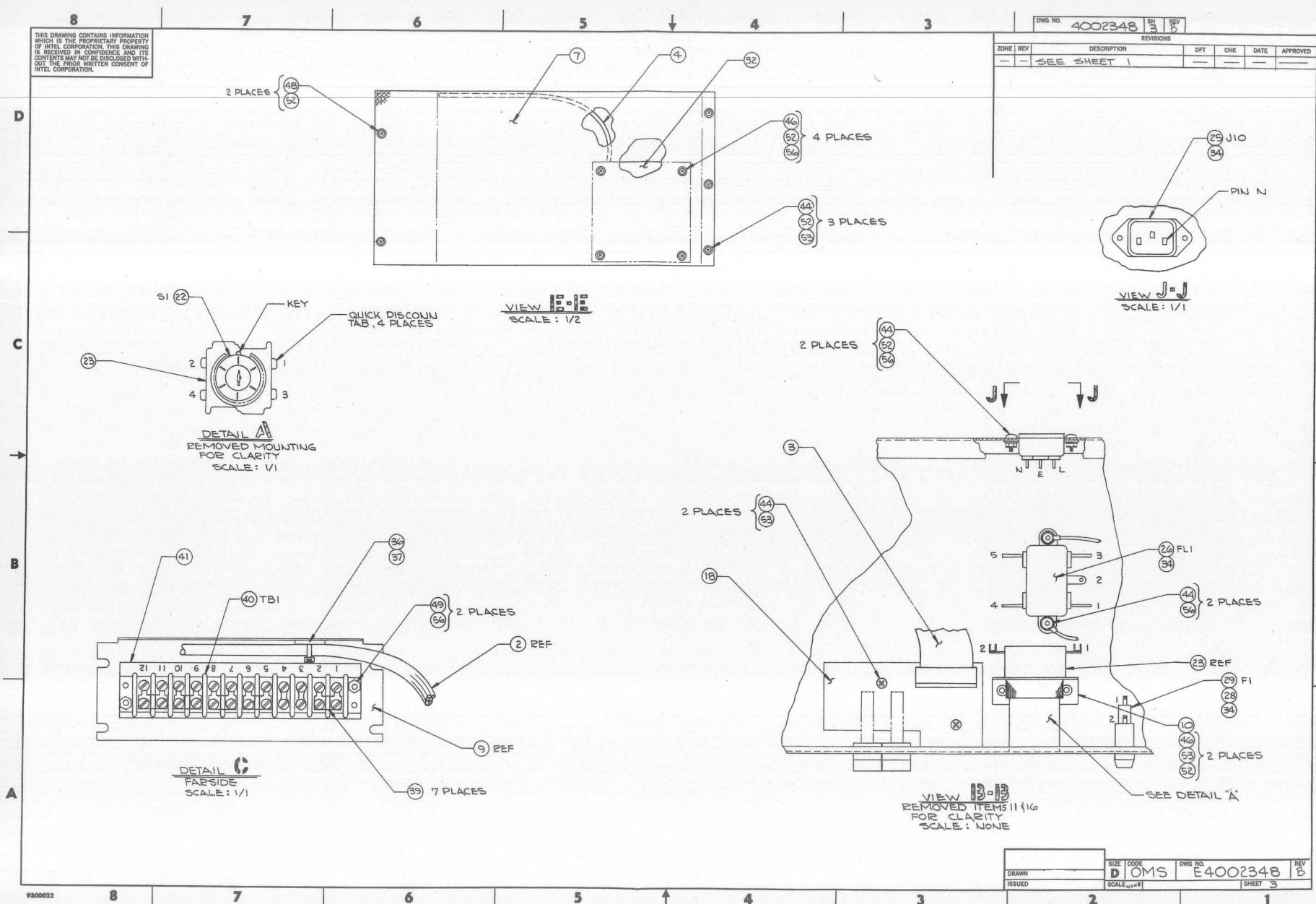
Service Information



**Figure 4-1. iCS 80 Chassis Assembly (Sheet 2 of 3)**

#### iCS 80 Chassis

## Service Information



**Figure 4-1. iCS 80 Chassis Assembly (Sheet 3 of 3)**

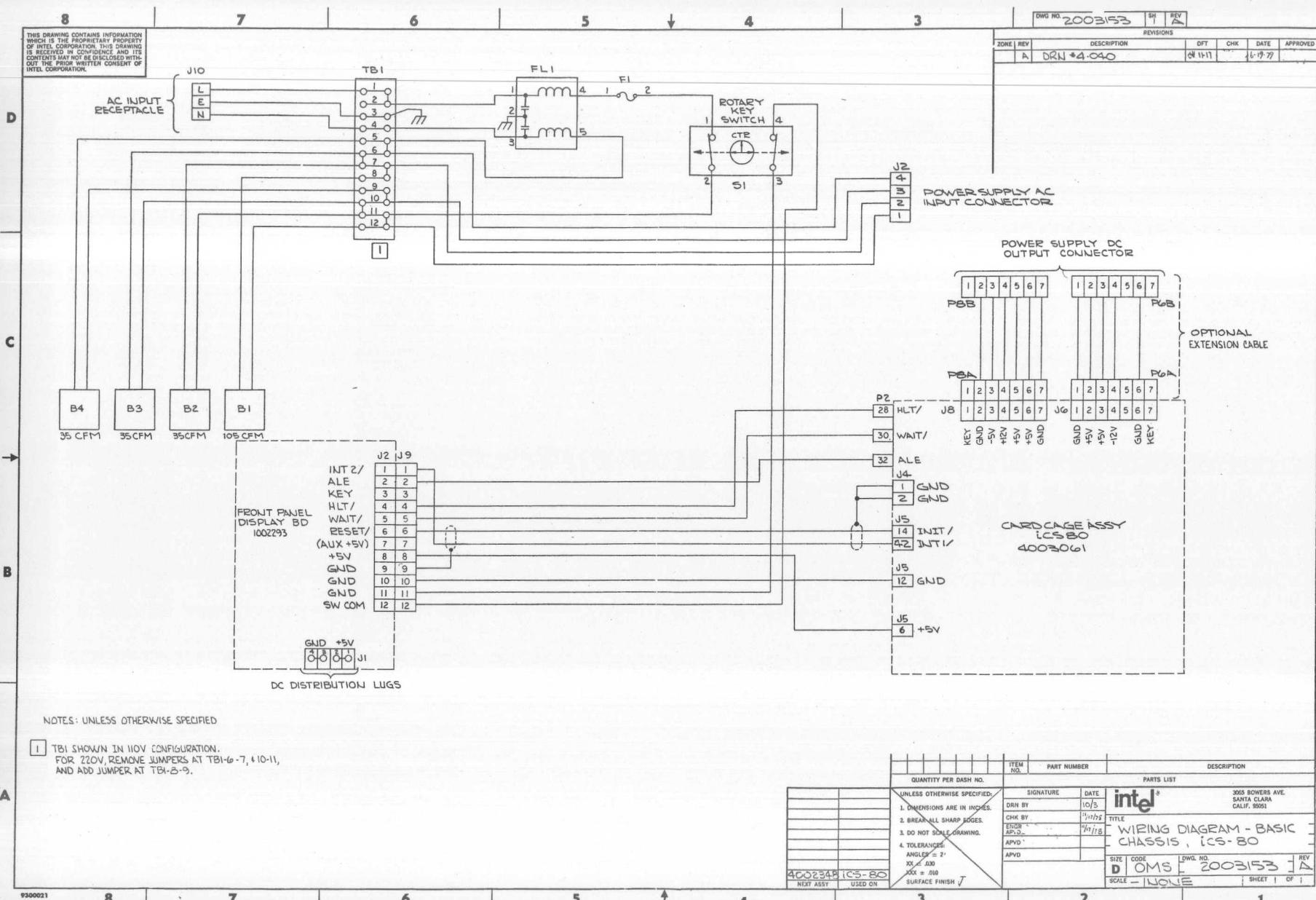


Figure 4-2. iCS 80 Chassis Schematic

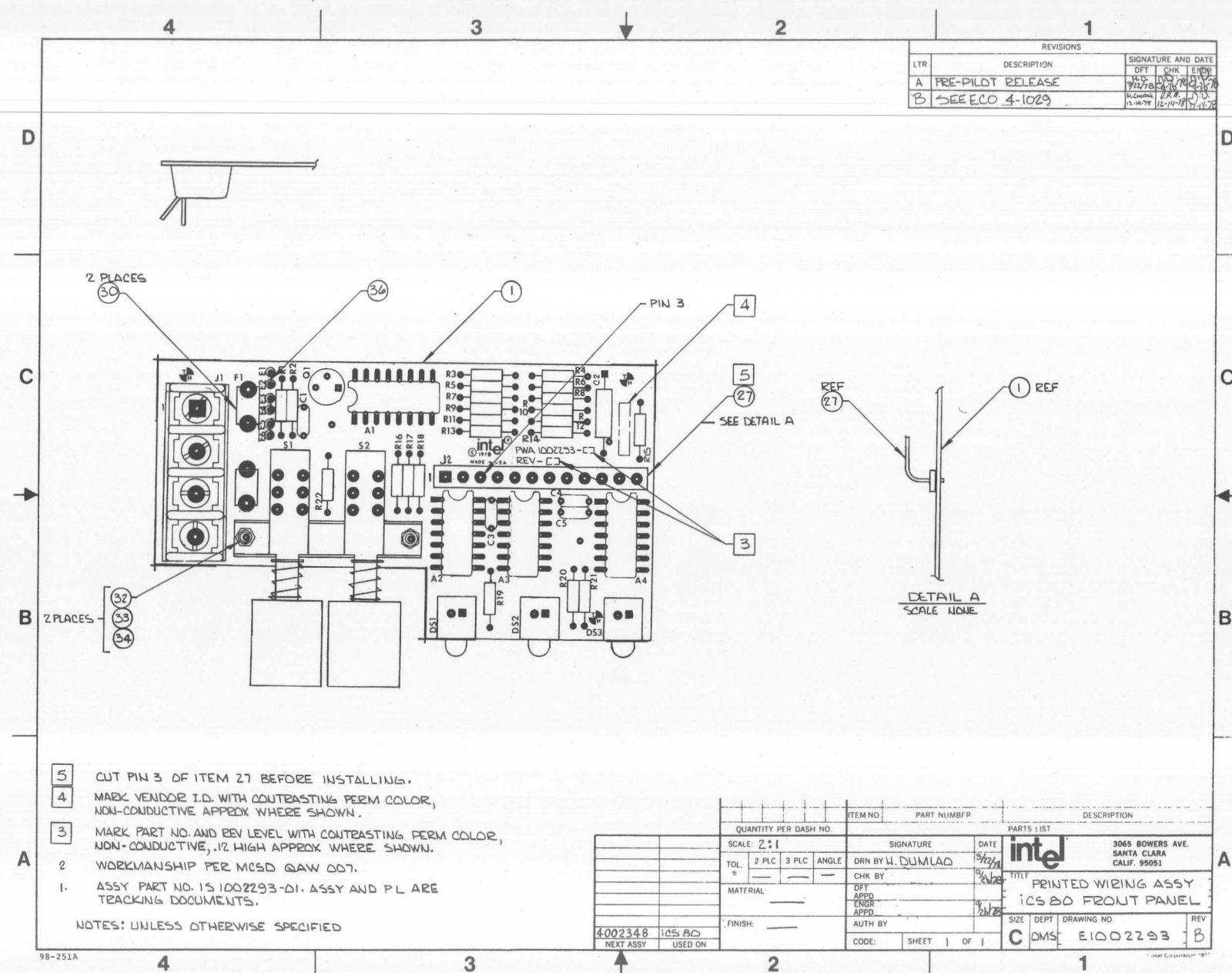


Figure 4-3. Display Board Assembly

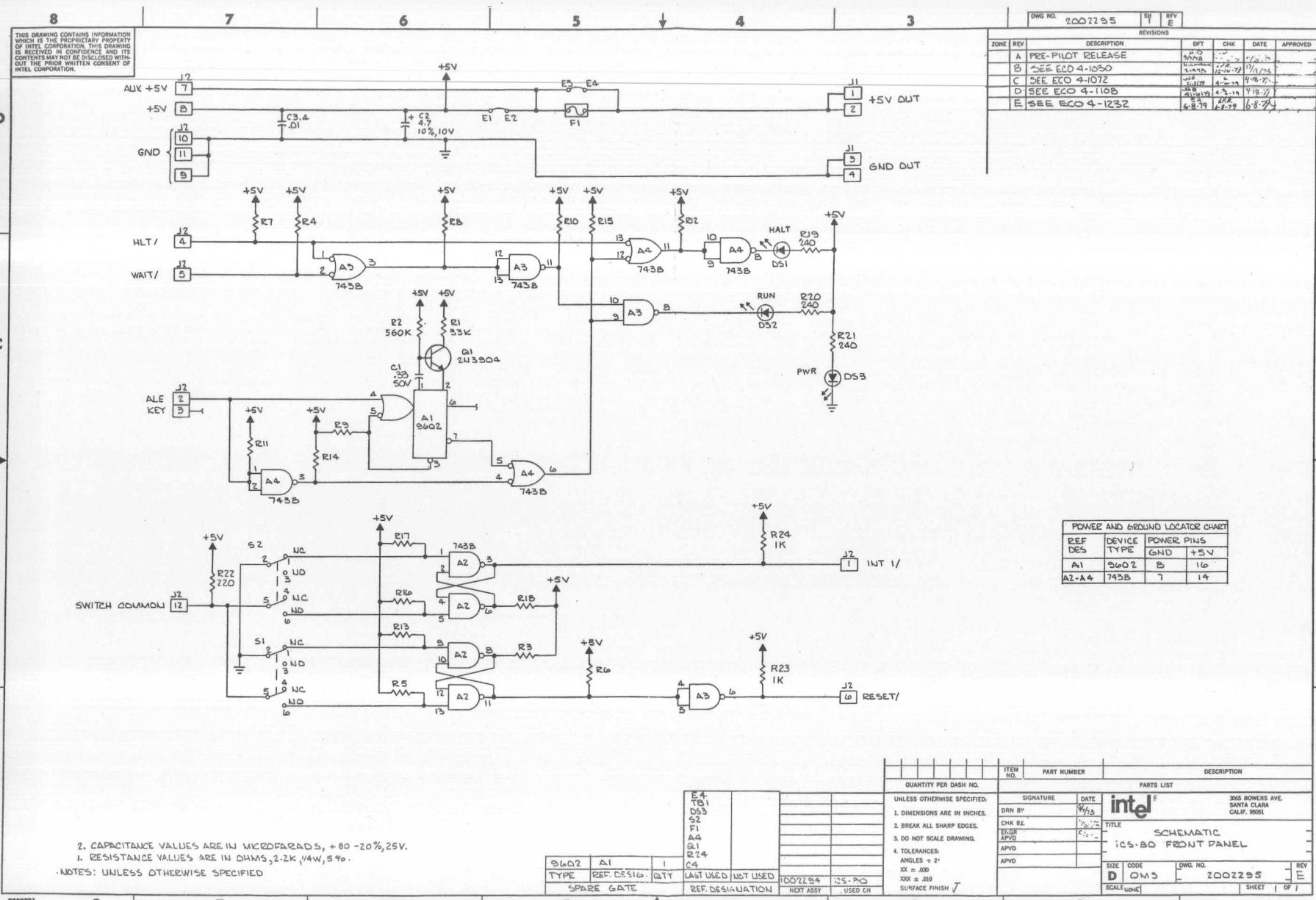


Figure 4-4. Display Board Schematic

